Center Innovation Fund: ARC CIF

Multilayer Optimized Uniform Nanomachined Diffractive Solar Wrap (MOUND)

Completed Technology Project (2012 - 2013)

Project Introduction

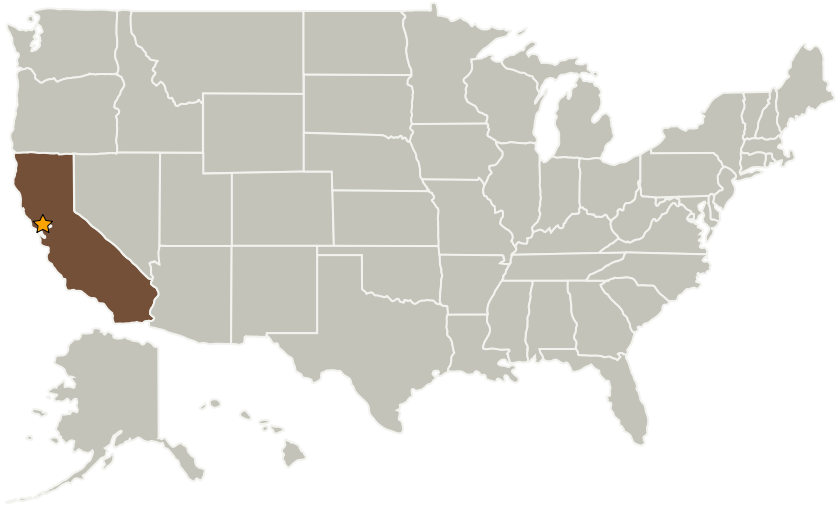
This work develops a novel, rollable, mass fabricable, low-concentration photovoltaic sheets for Cubesats providing them with efficient photoelectric conversion of direct and secondary diffuse light. The wrap consists of three thin (of order a millimeter or less), cheap plastic-sheet layers which concentrate (10x) on silicon strips.

Innovation: Although CPV has been used for small satellites including, they require precise tracking and active thermal management systems. We have built a CPV system that mitigates this completely leveraging non-imaging optics and nano-manufacturing techniques. Specifically, our innovations include:
· A design for a flat angular response curve which remains flat from normal incidence of over 35 degrees to the normal without tracking
· Diffraction Efficiency Modulation (DEM). MOUND shunts IR wavelengths in between cells optimizing cell performance.
· Mass-fabricable and Rollable. A master is fabricated enabling mass-replication via roll to roll UV embossing on cheap flexible plastic sheets. Technology can be used in flexible and rollable space applications.

Anticipated Benefits

This new model for rollable, mass fabricable, low-concentration photovoltaic sheets will revolutionize provision of efficient power for Cubesats.

Primary U.S. Work Locations and Key Partners



Multilayer Optimized Uniform Nanomachined Diffractive Solar Wrap

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Stories

Multilayer Optimized Uniform Nanomachined Diffractive (MOUND) *(https://techport.nasa.gov/file/2439)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Center Innovation Fund: ARC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

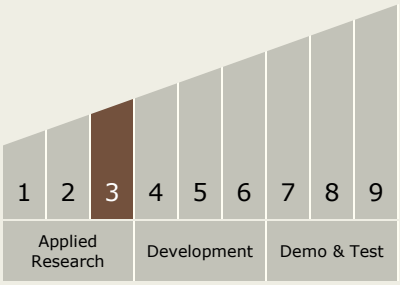
Harry Partridge

Principal Investigator:

Greg Dorais

Technology Maturity (TRL)

Current: **3**



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Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors